

appropriate regimen for the hydrogen addition to the etchant flow is preferably determined experimentally according to the etching parameters and the observed rate of polymer formation. The latter is monitored by observing the behavior of the sidewall profile. Endpoint detection is provided by optical emission spectroscopy and sensing endpoint on the oxygen peak. After endpoint, the oxide etch is continued for a timed over-etch period of about 30%. This assures complete opening of the via **44** in the low-k layer **38** (Fig. **3c**). Hydrogen may also be added during the over-etch period and, also for an additional period of several seconds after the flow of etchant gases has been terminated.

If the optional etch stop layer **36** was included, it is now removed by first stopping the hydrogen flow and then adding an O<sub>2</sub> flow to the fluorocarbon flow for a time period of between about 5 and 30 seconds. Residual photoresist **42** is then stripped, preferably by oxygen ashing although, in the alternative, liquid strippers may be used

It is not necessary to remove the residual ARL **20** after the via is opened. The residual ARL could be left to become part of the ILD layer or it can be removed by CMP in a later process step. The final via **44**, shown in Fig. **3d**, has essentially vertical sidewalls and cleanly exposes the conductive wiring **34**.